Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

LASERS IN PROSTHETIC DENTISTRY : AN INNOVATIVE MODERN TOOL

Dr. Shreya singh[*1], Dr. Karunakar Shetty[2] and Dr. G.R.Rahul[3]

[*1, 2, 3]Bangalore Institute of Dental Sciences and Research Centre, Bangalore, Karnnataka.

Corresponding author: Dr. Shreya Singh

Keywords:
Lasers, Neodymium-doped yttrium aluminium garnet, Removable prosthesis, Computer-Aided Design, fixed prosthesis.

Abstract
Lasers were introduced into the field of clinical dentistry with the hope of overcoming some of the drawbacks posed by the conventional methods of dental procedures. Since its first experiment for dental application in the 1960s, the use of laser has increased rapidly in the last couple of decades. At present, wide varieties of procedures are carried out using lasers. The aim of this article is to describe the current and emerging applications for lasers in prosthetic dentistry, used in conjunction with or as a replacement for traditional methods, it is observed that specific laser technologies are becoming an essential component of contemporary dental practice over a decade. Its applications ranges from fixed Prosthodontics to treatment of dentinal hypersensitivity to surface treatment of base metal alloys. Today it even extends to the fields of dental implantology and maxillofacial Prosthodontics.

INTRODUCTION

Light is an integral part of our life. The early 20th century saw one of the greatest inventions in science & technology, in that **LASERS** (Light Amplification by Stimulated Emission of Radiation) which later went on to became a gift to health sciences. A laser is an instrument that produces a very narrow, intense beam of light energy (electromagnetic radiation) through a process called stimulated emission. The use of lasers for treatment has become a common phenomenon in the medical field.[1]

In May16, 1960 at Hughes Research Laboratory in Malibu, California , the first working laser was invented by Theodore Harold Maiman who inserted a ruby rod into a photo-graphic flash lamp. In 1964, Ralph Stern and Reidar Sognnaes used the ruby laser to vaporise enamel and dentine. In 1969 Leon Goldman used the laser clinically on enamel and dentine. Initially, application of lasers for dental use was tested for hard tissue, but surface cracking and thermal damage to the enamel and dentine were reported. It is not until 1989 when the first dental laser was developed, a 3W neodymium-doped yttrium aluminium garnet (Nd:YAG) by Drs Terry and Bill Meyers, for soft tissue use, since that time a variety of laser wavelengths have been introduced and marketed.[2]

COMPONENTS OF A TYPICAL LASER

1) **Active medium:** The active medium is positioned within the laser cavity, an internally-polished tube, with mirrors co-axially positioned at each end and surrounded by the external energizing input, or pumping mechanism.

2) Pumping mechanism: This represents a man-made source of primary energy that excites the active medium. This is usually a light source, either a flashlight or arc-light, but can be a diode laser unit or an electromagnetic coil.

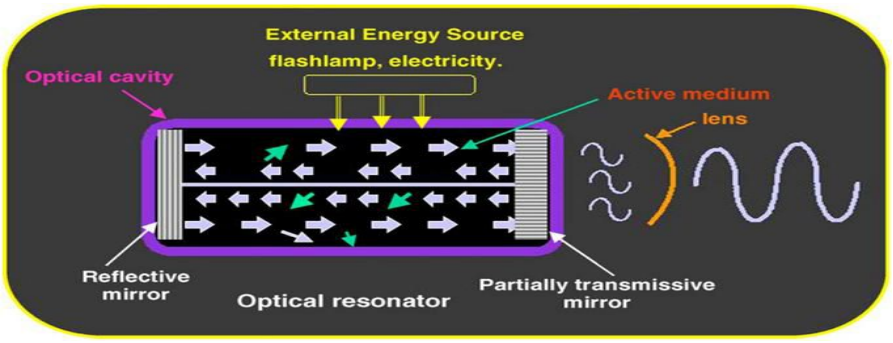
Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

3.) Optical resonator: Laser light produced by the stimulated active medium is bounced back and forth through the axis of the laser cavity, using two mirrors placed at either end, thus amplifying the power.

5) Delivery system: Depending upon the emitted wavelength, the delivery system may be a quartz fiber-optic, a flexible hollow waveguide, an articulated arm (incorporating mirrors), or a hand-piece containing the laser unit (at present only for low powered lasers).

5.) Cooling system: Co-axial coolant systems may be air- or water-assisted.

6.) Control panel: This allows variation in power output with time



Different Types of Lasers Used In Dental Treatment:
Several types of lasers are available based on the wavelengths [3]:

1. The Er: YAG laser possesses the potential of replacing the drill.
2. Co_2 laser can be used to perform gingivecotomy and to remove small tumours.
3. Argon laser is used in minor surgery.
4. Nd: YAG is used in tissue retraction, endodontics and oral surgery.
5. The diode laser is effective for oral surgery and endodontic treatment. This laser helps to correct aesthetics flaws. It is used for soft tissue procedures.

Contraindications and safety measures:-

- The risk of eye injury is minimal but must be considered, especially for high-output lasers in the invisible range.
- Diode laser light is generally divergent; however, if the light is collimated, the risk of eye injury increases significantly.
- Protective goggles, specific for the wavelength, must be used for the patient and the therapist.
- Although there are no contraindications reported for dental therapeutic lasers, some caveats and side effects exist.
- Suspected malignancies should never be treated by anyone but the specialist. Because laser light affects several rheologic factors, patients with coagulation disorders need special attention.
- Patients with chronic pain have reported increased tiredness \for a brief period, and long-standing pain conditions may transiently increase.
- Cannot be used in patients with pacemaker, Epileptics - light might trigger the seizure.
- Pregnancy- treat with caution, does not apply over fetus.

Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

Depending upon soft tissue and hard tissue lasers:-

Soft tissue lasers indications[4]:-

- Soft tissue management around abutments
- Second stage uncovering.
- Implant site preparation.
- Peri-implantitis
- Soft tissue modification
- Epulis fissuratum
- Denture stomatitis
- Treatment of flabby ridges
- Vestibuloplasty
- Sulcus deepening
- Frenectomies
- Treatment of soft tissue undercuts
- Planning the shape and position of the prostheses.
- Three dimensional acquisition of optical data of the extraoral defects.

Hard tissue lasers indications[4]:-

- Prototyping and CAD/CAM (Computer Aided Design and Computer Aided Manufacturing) technology.
- Crown lengthening
- Osseous crown lengthening
- Troughing
- Formation of ovate pontic sites
- Altered passive eruption management
- Bleaching
- Veneer removal
- Tooth preparation for veneers and full coverage crowns and bridges
- Removal of carious lesion and faulty composite restorations before placement of final restorations.
- Crown fractures at the gingival margins Enamel and dentin Etching
- Tuberosity reduction
- Torus reduction
- Osseoectomy during tooth/root extraction or ridge recontouring
- Treatment of hard tissue undercuts
- Laser titanium sintering
- Laser ablation of titanium surfaces
- Laser assisted hydroxyapatite coating
- Laser welding of titanium components of the prostheses

Commonly used laser in dentistry[4]:-

Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

Laser	Wavelength	Indications
Argon	488,515 nm	Pigmented lesions, Vascular anomalies, Plastic surgery
Diode	620-900 nm	Periodontal surgery, Bleaching, Photodynamic therapy, Soft laser therapy, Other soft tissue procedures
CO_2	10,600 nm	Soft tissue procedures
Nd:YAG	1,064 nm	Soft tissue procedures, Periodontal surgery, Pigmented lesions
Ho:YAG	2,100 nm	Arthroscopic surgery, soft tissue surgery
Er,Cr:YSGG	27Ba nm	Bone surgery, Periodontal surgery, Cavity preparations
Er:YAG	2944 nm	Bone-surgery, Skin resurfacing, Cavity preparations

Classification of Lasers[6]:-
According to ANSI and OHSA standards lasers are classified as [3]:

Class I- These are low powered lasers that are safe to use. e.g. Laser beam pointer
Class II- Low powered visible lasers that are hazardous only when viewed directly for longer than 1000 seconds, e.g. He-Ne lasers
Class II b - Low powered visible lasers that are hazardous when viewed for more than 0.25 seconds.
Class III a - Medium powered lasers that are normally hazardous if viewed for less than 0.25 seconds without magnifying optics.
Class III b - Medium powered lasers that can be hazardous if viewed directly.
Class IV - These are high powered lasers (> 0.5 W) that produce ocular skin and fire hazards.

According to wavelength and medium lasers are classified as[14]:

Laser Type	Current/Potential dental application
Eximer Lasers Argon Fluoride (ArF) Xenon Chloride (XeCl)	Hard Tissue ablation, Dental Calculus removal
Gas Lasers Argon (Ar)	Curing of composite materials Tooth whitening,Intraoral soft tissue surgery, Sulcular debridement
Helium Neon (HeNe)	Analgesia, Treatment of dentin hypersensitivity, Apthous ulcer treatment
Carbon dioxide (CO_2)	Intraoral and Implant soft tissue surgery, apthous Ulcer treatmenbt, removal of gingival melanin pigmentation, treatment of dentine hypersensitivity, analgesia
Diode-lasers Indium gallium arsenide Phosphorous (InGaAsP)	Caries detection
GaliumAluminium Arsenide (GaAlAs)	Intra oral general and implant soft tissue surgery,sulcular debridement, Galium arsenide (GaAs) (subgingival curettage in periodontitis and periimplantitis) Analgesia, Treatment of dentine hypersensitivity,pulpotomy,Root canal disinfection
Solid State Lasers Frequency doubled calculus Alexandrite	Selective ablation of dental plaque
Neodymium : YAG (Nd:YAG)	Intraoral soft tissue surgery, sulcular debridement, Analgesia, Treatment Of Dentine hypersensitivity,Pulpotomy
Erbium Group Erbium:YAG	Caries removal & cavity prepration Modification of enamel & dentine surfaces, Uncovering of implants,soft tissue surgery, Treatment of dentine

Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

Dental Laser Safety [7,8]

Laser safety is an issue limited not only to the performance of treatment within the dental operatory, but one that also encompasses the inter- relationship among health care providers, educational institutions, government and commercial sector. Given proper training with appropriate precautions, lasers may be used safely for the mutual benefit of both the patient and the dentist. According to the CDRH and ANSI system of classification, class 4 lasers are defined as those devices that pose a biologic hazard from either direct or diffuse reflection.

CLASS	DESCRIPTION
I	Very low risk "safe under reasonable foreseeable use"
IM	Wavelength between 302.5 nm and 4000nm and are safe except when used with optical aids (e.g. binoculars)
II	Do not permit human access to exposure levels beyond the Class 2 AEL (Accessible Emission Limit) for wavelength between 400nm and 700nm
IIM	Have wavelength between 400nm and 700nm and are potentially hazardous when viewed with an optical instrument
IIIR	Range from 302.5 nm and 106nm and is potentially hazardous but the risk is lower than that of Class IIIB lasers
IIIB	Normally hazardous under direct beam viewing conditions, but are normally safe when viewing diffuse reflections
IV	Hazardous under both intra beam and diffuse reflection viewing conditions. They may cause also skin injuries and are potential fire hazards.

Application of lasers in prosthetic dentistry [4]**:**

A. COMPLETE DENTURE PROSTHODONTICS:

1. Prototyping and CAD/CAM (Computer Aided Design and Computer Aided Manufacturing) technology.
2. Analysis of occlusion by lasers in CAD/CAM.
3. Analysis of accuracy of impression by laser scanner.

B. FIXED PROSTHETICS/ESTHETICS :

1. Crown lengthening
2. Soft tissue management around abutments
3. Osseous crown lengthening
4. Troughing
5. Formation of ovate pontic sites
6. Altered passive eruption management
7. Bleaching
8. Veneer removal
9. Tooth preparation for veneers and full coverage crowns and bridges
10. Removal of carious lesion and faulty composite restorations before placement of final restorations.
11. Crown fractures at the gingival margins Enamel and dentin Etching

Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

C. IMPLANTOLOGY

1. Second stage uncovering.
2. Implant site preparation.
3. Peri-implantitis

D. REMOVABLE PROSTHETICS

1. Tuberosity reduction
2. Torus reduction
3. Soft tissue modification
4. Epulis fissuratum
5. Denture stomatitis
6. Residual ridge modification
7. Treatment of flabby ridges
8. Vestibuloplasty
9. Sulcus deepening
10. Frenectomies
11. Osseoectomy during tooth/root extraction or ridge recontouring
12. Treatment of soft tissue and hard tissue undercuts

E. LASER APPLICATIONS IN THE DENTAL LABORATORY

1. Laser titanium sintering
2. Laser ablation of titanium surfaces
3. Laser assisted hydroxyapatite coating
4. Laser welding of titanium components of the prostheses

F. LASERS IN MAXILLOFACIAL REHABILATION

1. Planning the shape and position of the prostheses.
2. Three dimensional acquisition of optical data of the extraoral defects.

Advantages of Laser over the Other Techniques [3]:

- It is painless, bloodless that results in clean surgical field, and fine incision with precision is possible.
- There is no need for anaesthesia if at all anaesthesia has to be administered, then it needs to be used minimally only.
- The risk of infection is reduced as a more sterilized environment is created as the laser kills bacteria.
- No postoperative discomfort, minimal pain and swelling, generally doesn't require medication.
- Superior and faster healing, offers better patient compliance.

Disadvantages of Lasers [3]:

- Healing from laser surgery is usually excellent, with decreased scarring and increased function; however, the speed of healing usually is prolonged compared with other types of wounds. This delay in healing undoubtedly is due to the sealing of blood vessels and lymphatics and the subsequent need for neovascularization for healing.

Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

- Typical intraoral healing takes 2 to 3 weeks for wounds that normally would take 7 to 10 days.
- Lasers treatment is more expensive as the cost of the laser equipment itself is much higher.

A. COMPLETE DENTURE PROSTHODONTICS [1, 5, 6]:

I) PROTOTYPING AND CAD/CAM TECHNOLOGY: The term rapid prototyping (RP) refers to a class of technologies that can automatically construct physical models from Computer-Aided Design (CAD) data. These "three dimensional printers" allow designers to quickly create tangible prototypes of their designs, rather than just two-dimensional pictures. Such models have numerous data.

In addition to prototypes, RP techniques can also be used to make tooling (referred to as rapid tooling) and even production-quality parts (rapid manufacturing).A software package slices the CAD model in to a number of thin (eg.0.1mm) layers, which are then built up one atop another. Rapid prototyping is an additive process, combining layers of paper, wax, or plastic to create a solid object.

In contrast, most machining processes (milling, drilling, grinding, etc.) are "subtractive" processes that remove material from a solid block. RP's additive nature allows it to create objects with complicated internal features that cannot be manufactured by other means.

LASER RAPID FORMING OF A COMPLETE TITANIUM DENTURE BASE PLATE:[7] This technique uses the combination of the CAD/CAM and LRF (Laser Rapid Forming) methods for forming the titanium plate of a complete denture. Laser scanner, reverse engineering software, and standard triangulation language (STL) formatted denture base plate and sliced into a sequence of numerical controlled codes.

The denture plate will be built layer-by-layer, on the LRF system.

After the traditional finishing techniques, this denture plate will be acceptable for use in patients.

II) STUDY OF COMPLETE DENTURE OCCLUSION USING BY THREE-DIMENSIONAL TECHNIQUE:[8] After fabrication of new dentures the occlusion can be examined and studied with the help of laser scanner technique and three-dimensional reconstruction. The relationship between the parameters of balanced occlusion can also be analyzed.

III) ANALYSIS OF ACCURACY OF IMPRESSION BY LASER SCANNER: Several studies have made comparisons in the dimensional accuracy of different elastomeric impression materials. Most have used two dimensional measuring devices, which neglect to account for the dimensional changes that exist along a three-dimensional surface.

The scanning laser three-dimensional (3D) digitizer can delineate x, y, and z coordinates from a specimen without actually contacting the surface. The digitizer automatically tracks coordinates with precision and stores data as the number of points on a surface with a resolution of 130 mm at 100 mm. These exacting features suggest that the laser digitizer might accurately and reliably measure the dimensions of dental impression materials while avoiding subjective errors.

The image is built up and landmarks identified which allow superimposition of the images and so enable the differences between two similar images to be calculated.

Three-dimensional digitizers will eventually become less expensive, require less maintenance, track faster, and be available with more standardized software.

B. Fixed prosthesis/esthetics

1. **Crown lengthening**: Clinical scenarios where crown lengthening methods are specified within esthetic zone, need attention to attain esthetic results. Crown lengthening methods with the help of lasers are included in following situation:
    a. Caries at gingival margin
    b. Cuspal fracture extending apically to the gingival margin
    c. Endodontic perforations near the alveolar crest.
    d. Insufficient clinical crown length.

Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

e. Difficulty in a placement of finish line coronal to the biological width.
f. Need to develop a ferrule.
g. Unaesthetic gingival architecture.
h. Cosmetic enhancements.

i. Lasers offer unparallel accuracy and operator control and may be helpful for finely tracing incision lines and shaping the desired gingival margin outline. All the other crown lengthening methods has disadvantages in surgical approach healing time is longer, post healing gingival margin position is doubtful and patient compliance is poor as it needs use of anesthesia and scalpel for electro-surgery , the heat liberated has effect on pulp and bone leading to pulp death or bone necrosis.

B .Soft tissue management around abutments: Argon laser energy has peak absorption in hemoglobin, thus, providing excellent hemostasis and well regulated coagulation and vaporization of oral tissues. These characteristics are beneficial for retraction and hemostasis of the gingival tissue in preparation for an impression during a crown and bridge method. Argon laser with 300 um fiber, and a power setting of 1.0W, continuous wave delivery, and the fiber is placed into the sulcus in contact with the tissue. In a sweeping motion, the fiber is moved around the tooth. It is dominant to contact the fiber tip with the bleeding vessels. Provide suction and water spray in the field. Gingivoplasty may also be done using argon laser.

2. **Modification of soft tissue around laminates:** The removal and re-contouring of gingival tissues cover can be easily efficient with the argon laser. The laser can be used as a primary surgical instrument to detach excessive gingival tissue, whether diseased, secondary to drug therapy or orthodontic treatment. The laser will detach tissue and supply hemostasis and tissues join the wound.

3. **Osseous crown lengthening:** Like teeth mineralized matrix of bone contains mainly of hydroxyapatite. The water content and hydroxyapatite produce for the high absorption of the Er: YAG laser light in the bone. Er: YAG laser has potential for bone ablation.
4. **Formation of ovate pontic sites**: There are many causes of the inappropriate pontic site. Two of the most common causes are inadequate compression of alveolar plates after an extraction and non-replacement of a fractured alveolar plate. Inappropriate pontic site results in unesthetic and non-self-cleansing pontic design. For favorable pontic design re-contouring of soft and bony tissue may be required. Soft tissue surgery may achieved with the soft tissue lasers and osseous surgery may achieved with erbium family of lasers. The use of an ovate pontic receptor site is of great value when trying to produce a natural maxillary anterior fixed bridge. This is easily good with the use of a laser.

5. **Altered passive eruption management:** Lasers can be easily to control passive eruption problems. When the patients have clinical crowns that appear too short or when they have a jagged gingival line creating an uneven smile, excessive tissue can be detached without the need for blade incisions, flap reflection, or suturing.

6. **Laser troughing:** Lasers can be used to produce a groove around a tooth before impression taking. This can be restored the require for retraction cord, electrocautery, and the use of hemostatic agents. The results are obvious, well regulated, minimize impingement of epithelial attachment, cause less bleeding during the impression, decrease postoperative problems and chair time. It changes the biological width of the gingiva. After laser grooving, the impression is taken and sent to the lab for prosthetic work. The main function of the marginal finish line is to keep the biological width, it acts as the termination point of tooth preparation, help in ease of fabrication, helps in taking a proper impression. In brittle teeth to keep the biological width and finish line laser grooving plays a main role.

Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

7. **Bleaching:** Esthetics and smile are main situation in our modern society. Bleaching of teeth can be achieved in the Dental OPD. Diode lasers are used to bleach teeth without causing much tooth sensitivity and modification of the complexion of the tooth.

8. **Removal of veneer:** Restoration can be removed without cutting with the help of laser beams. The laser energy passes through porcelain glass unchanged and is occupied by the water molecules present in the adhesive. Debonding takes place at the junction of the silane and the resin without causing any trauma to the underlying tooth.

9. **Crown Preparation[5]:** Crown preparation with lasers a debated topic still. There are no conclusive studies yet showed the use of lasers for crown preparation purposes. But still some commercial companies say that they can be used. Er, Cr: YSGG laser is used most commonly now. It uses hydrokinetic technology (laser-energized water to cut or ablate soft and hard tissue).Because of this mechanism local anesthesia is not required in many cases, making this more comfortable procedure for the patient, and of course, saving time and anesthetic use by the patient. For vital crown preparation no need of local anesthesia, as laser causes temporary paresthasia of nerve endings. Procedure is accurate and faster than the conventional method.

C. Implantology[5,6,8],

1. Implant recovery: One advantage of use of lasers in implantology is that impressions can be taken immediately after second stage surgery because there is little blood contamination in the field due to the haemostatic effects of the lasers. There also is minimal tissue shrinkage after laser surgery, which assures that the tissue margins will remain at the same level after healing as they are immediately after surgery.

B. Implant site preparation: Lasers can be used for the placement of mini implants especially in patients with potential bleeding problems, to provide essentially bloodless surgery in the bone.

C. Removal of diseased tissue around the implant: Lasers can be used to repair ailing implants by decontaminating their surfaces with laser energy. Diode, CO2 & Er:YAG lasers can be used for this purpose. Lasers can also be used to remove granulation tissue in case there is inflammation around an already osseointegrated implant.

D. Sterilization of socket: In immediate implant dentistry after extraction of tooth, without any infection, socket can be sterilized immediately without any pain.

E. Peri Implantitis: Since the laser does not transmit damaging heat, it can be utilized to vaporize any granulation tissue as well as clean the implant surface in peri-implantitis cases. This procedure eliminated the acute state of periimplantitis, resulting in positive GTR, and allowing the patient extended use of the implant.

F. Sinus lift procedure: Lasers can also be used in the sinus lift procedure. The procedure can be done by making the lateral osteotomy with a decreased incidence of sinus membrane perforation.
The yttrium-scandium-gallium-garnet (YSGG) laser is the optimal choice for not cutting the sinus membrane.The YSGG laser can also be used to make the osteotomy for a ramal or symphyseal block graft.
Bone grafts done with lasers have been demonstrated to decrease the amount of bone necrosis from the donor site and the osteotomy cuts are narrower, resulting in less postoperative pain and edema.

Open Access Journal
International Journal of Medical Research and Pharmaceutical Sciences
Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

D. REMOVABLE PARTIAL DENTURES:[1,5,6,7,9,11]

Laser welding:

One of the modern methods of removable partial dentures defect repairs uses the pulsed laser with relative low average out power. This is known as a precise and rapid joining method, but its success depends on the control of many parameters.

Eg: For Co-Cr alloy frameworks:

The welding parameters were determined for each defect type and working step (fixing, joining, filling, planning).Adequate combination of pulse energy (6-14 J), pulse duration (10-20 ms) and peak power (600- 900 W) depending on the working stage improves the success of the welding procedure.

Treatment of unsuitable alveolar ridges: Alveolar resorption usually is uniform in vertical and lateral dimensions. To smooth the residual ridge, to expose the bone soft tissue lasers surgery may be performed with any number of soft tissue wavelengths (CO2, diode, Nd:YAG,) Hard tissue surgery may be performed with the erbium family of wavelengths.

Treatment of undercut alveolar ridges: There are many causes of undercut alveolar ridges. Naturally occurring undercuts such as those found in the lower anterior alveolus or where a prominent pre-maxilla is present may be the cause of soft tissue trauma, ulceration, and pain when prosthesis is placed on such a ridge. Soft tissue surgery may be performed with any of the soft tissue lasers. Osseous surgery may be performed with the erbium family of lasers.

Treatment of enlarged tuberosity: The most common reason for enlarged tuberosities usually is soft tissue hyperplasia and alveolar hyperplasia accompanying the over-eruption of unopposed maxillary molar teeth. Surplus soft tissue should be excised, allowing room for the denture bases. The soft tissue reduction may be performed with any of the soft tissue lasers. Erbium laser is the laser of choice for the osseous reduction.

Surgical treatment of tori and exostoses: Prosthetic problems may arise if maxillary tori or exostoses are large or irregular in shape. Soft tissue lasers may be used to expose the exostoses and erbium lasers may be used for the osseous reduction. A smooth, rounded, midline torus normally does not create a prosthetic problem because the palatal acrylic may be relieved or cut away to avoid the torus.

Soft tissue lesions: Persistent trauma from a sharp denture flange or over compression of the posterior dam area may produce a fibrous tissue response. Hyperplastic fibrous tissue may be formed at the junction of the hard and soft palate as a reaction to constant trauma and irritation from the posterior dam area of the denture. The lesion may be excised with any of the soft tissue lasers and the tissue allowed to re- epithelialize.

E.LASER APPLICATIONS IN THE DENTAL LABORATORY[4]

Lasers have been used for deposition of hydroxyapatite (HA) thin films on titanium implants. pulsed laser deposition (PLD) has proven to be a promising method to produce pure, crystalline and adherent HA coatings which show no dissolution in a simulated body fluid .

Use of lasers for surface treatment of titanium castings for ceramic bonding have shown improved bond strength when compared to acid etching techniques which are commonly used. Lasers can also be used for welding.

F. Maxillofacial Prosthetics[5]

New advances in rapid prototyping technologies have demonstrated significant advantages compared to more conventional techniques for fabricating facial prosthesis. The use of selective laser sintering technology is an alternative approach for fabricating a wax pattern of maxillofacial prosthesis. This new approach can generate the wax pattern directly and reduce labor-intensive laboratory procedures.

Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

CONCLUSION

Dental lasers are now well established instruments. The ability to perform less invasive procedures with greater patient comfort makes laser dentistry something the modern practitioner should consider. The use of laser in prosthetics has so many advantages like precision, ease of operation, patient comfort, time reduction etc. So it is the need of the hour to incorporate laser to fullest extent in dentistry which in turn will lead not only to the modernization of treatment but wellness of mankind.

REFERENCES

1. *LASERS IN PROSTHODONTICS- A REVIEW. Sandesh Gosawi, Sanajay Kumar, Rohit Lakhyani, Shraddanand Bacha, Shivaraj Wangadargi. Journal of Evolution of Medical and Dental Sciences/Volume1/ Issue4/October – 2012.*

2. *Lasers in Prosthetics. Deepak Thomas. Indian J Dent Adv 2014; 6(3): 1600-1604.*

3. *The Current Status of Laser Applications In Prosthodontics .Vikas Punia, Vivek Lath, Meenakshi Khandelwal, Sandhya Kapoor Punia, Rohit Lakhyani. NJIRM 2012; Vol. 3(3). July –August.*

4. *Lasers in Prosthodontics- A Review. Priya Nachrani , Rajeev Srivastava , Umesh Palekar, Vivek Choukse. NJDSR Number 2, Volume 1, January 2014.*

5. *Lasers in Prosthetics. Deepak Thomas. Indian J Dent Adv 2014; 6(3): 1600-1604.*

6. *CASE REPORT: Clinical Crown Lengthening: Laser-Assisted Versus Conventional surgical therapy. S Milavec1 and B Gaspirc. Journal of the Laser and Health Academy Vol. 2014, No.1.*

7. *DENTAL LASERS - A BOON TO PROSTHODONTICS- A Review Nadgere Jyoti , Madhukar Pankaj, Gurav Tulika, Ahuja Shelly. INTERNATIONAL JOURNAL OF DENTAL CLINICS 2010:2(2):13-21.*

8. *Lasers and its Clinical Applications in Dentistry. Mahavir.B.Mishra, Shanu Mishra. INTERNATIONAL JOURNAL OF DENTAL CLINICS 2011:3(4):35-38.*

9. *Lasers in Prosthodontics - An Overview Part 1: Fundamentals of Dental Lasers. Aruna M. Bhat. Journal of Indian Prosthodontic Society (March 2010) 10:13–26.*

10. *Clinical applications of lasers during removable prosthetic reconstruction. Gabi Kesler. Dent Clin N Am 48 (2004) 963–969.*

11. *Dental Lasers – A Prosthodontic Perspective!!! Dr. GursahibaSahni1, Dr. Vijaysinh More. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) Volume 14, Issue 7 Ver. IV (July. 2015).*

12. *Improving denture- bearing area using diode laser. Vidya Bhat, Sonia Sara Jocob, Kamalakanth Shenoy. 10.5005/jp-journals-10022-1058.*

13. *Crown lengthening using diode laser: A case series S. Gokulanathan, Deepu Mathews, Rajkumar Daniel, R. Ahathya. Journal of Indian Academy of Dental Specialist Researchers | Vol. 1 | Issue 2 | Jul-Dec 2014.77*

14. *Laser and it's Application in Prosthetic Dentistry. Shaista Durrani. Int J Dent Med Res | MAR- APR 2015 | VOL 1 | ISSUE 6.*

Volume 3 (Issue 8) : August 2016 ISSN: 2394-9414
DOI: 10.5281/zenodo.61333 Impact Factor- 3.109

15. *Laser-Assisted Soft and Hard Tissue Crown Lengthening. Journal of Laser Dentistry. Michael K. McGuire; E. Todd Scheyer | 2012 Vol. 20, No. 1.*

16. *Crown Lengthening Michael K. McGuire; E. Todd Scheyer Procedures- A Review Article Dr. Gunjan Gupta, Dr. Ramesh Gupta, Dr. Nishant Gupta, Dr. Udit Gupta.*

17. *Laser-Assisted Flapless Crown Lengthening: A Case Series.. Journal of Laser Dentistry | 2012 Vol. 20, No.1*

18. *Esthetic crown lengthening with depigmentation using an 810 nm GaAlAs diode laser Amit Arvind Agrawal. Indian J Dent. 2014 Oct-Dec; 5(4): 222–224.*

19. *Low Level Laser Therapy in Modern Dentistry. Natalia Elson and Denise Foran. Vol. 1 No. 1:2, 2015.*